WHAT IS CLAIMED IS:

1. A computer system for determining an internal cooling geometry of a bucket for a turbine engine, the internal cooling geometry being defined by a plurality of geometry variables, the computer system comprising:

a simulation module for forming a model of the bucket having the internal cooling geometry, and executing a simulation of a thermal environment within the turbine engine, and outputting a performance parameter being predicted for the bucket based on the model; and

an optimizer for comparing the performance parameter with respect to a baseline criterion and for automatically modifying at least one geometry variable for the internal cooling geometry of the bucket for outputting a plurality of attribute data of the internal cooling geometry.

2. The computer system of claim 1, wherein the simulation module further comprises a finite element analysis module and a finite element mesh generator.

3. The computer system of claim 2, wherein the model further comprises a finite element mesh of an internal geometry and an external geometry of a solid model based on the bucket.

4. The computer system of claim 3, further comprising a boundary condition processor for defining the simulated thermal environment within the turbine engine.

5. The computer system of claim 4, wherein the boundary condition processor outputs a set of boundary conditions for the model being logically mapped to the finite element mesh of the internal and external geometry of the solid model.

6. The computer system of claim 5, further comprising a control server for operating with the simulation module, the optimizer, and the boundary condition processor.

7. The computer system of claim 1, wherein the simulation module further comprises a finite element analysis module and a finite element mesh generator for generating the model based on a solid model of the bucket.

8. The computer system of claim 7, further comprising an agent for cooperating with the simulation module and the optimizer to create the internal cooling geometry of the solid model for the bucket.

9. The computer system of claim 8, wherein the agent calculates a plurality of geometric properties of the solid model, and calculates a global finite element size for creating the finite element mesh, approximates the internal cooling geometry of the bucket with adaptive curve fitting, and cooperates with the finite element mesh generator to create a finite element mesh of the internal cooling geometry.

10. The computer system of claim 1, further comprising a controller operating on a computer network coordinating the simulation module and the optimizer.

11. A computer system for optimizing a radial cooled bucket for a turbine engine, the system comprising;

a simulator for processing an analytical model of the radial cooled bucket being defined by an external geometry and a cooling geometry, the analytical model having a plurality of external boundary conditions and internal boundary conditions, and the simulator using finite element thermal analysis and outputting at least one performance parameter based on analytical model;

an optimizer for comparing the performance parameter to a baseline parameter to determine attribute data of an internal cooling geometry of the radial cooled bucket; and

a program in computer readable code for controlling the operation of the simulator and the optimizer until the attribute data is determined, such that the program continually modifies the cooling geometry to create a modified analytical model such that the simulator processes the modified analytical model having the external boundary conditions and a plurality of modified internal boundary conditions linked to a modified cooling geometry.

12. The computer system of claim 11, further comprising a finite element mesh generator.

13. The computer system of claim 12, further comprising a boundary condition generator for defining a simulated thermal environment within the turbine engine.

14. The computer system of claim 13, further comprising a graphics processor for generating a solid model of the radial cooled bucket for the turbine engine.

15. The computer system of claim 14, further comprising an agent cooperating with the simulator for creating the cooling geometry and modified cooling geometry of the radial cooled bucket.

16. A computer system for determining an internal heat exchanging geometry of a bucket for a turbine engine, the computer system comprising:

means for generating a model of the bucket having an internal cooling geometry;

means for simulating a thermal environment within the turbine engine using the model and for outputting a performance parameter being predicted for the bucket based on the model; and

means for optimizing the performance parameter with respect to a baseline parameter and for modifying at least one variable for the internal cooling geometry of the bucket for outputting a plurality of attribute data of the internal cooling geometry.

17. The computer system of claim 16, further comprising a means for generating a solid model geometry of the bucket.

18. The computer system of claim 17, wherein the means for simulating further comprises a means for processing the model using finite element analysis.

19. The computer system of claim 18, further comprising means for creating and mapping boundary conditions for the model.

20. The computer system of claim 19, further comprising means for automatically creating the internal cooling geometry of the model of the bucket.

21. The computer system of claim 20, further comprising means for controlling the means for simulating and the means for optimizing

22. A method of computer processing airfoil attribute data of a radial cooled bucket for a turbine engine, the method comprising the steps of:

a) providing a model based on the attribute data of the radial cooled bucket, the model having an external finite element geometry and an internal finite element geometry;

b) mapping a plurality of external boundary conditions to the external finite element geometry;

c) mapping a plurality of internal boundary conditions to the internal finite element geometry;

d) simulating, in a heat transfer analysis, a predicted response of the radial cooled bucket based on the model having the set of external boundary conditions and the set of internal boundary conditions;

e) optimizing the internal finite element geometry by comparing the predicted physical response to a predetermined baseline to determine a best match; and

f) modifying the internal finite element geometry of the model and the set of internal boundary conditions in response to step e);

g) repeating steps b) through f) until a best match occurs; and

h) in response to the best match, outputting the attribute data associated with the modified internal finite element geometry.

23. The method of claim 16, further comprising the step of calculating a plurality of geometric properties of the model.

24. The method of claim 17, further comprising the step of calculating a finite element size for creating the external finite element geometry and an internal finite element geometry.

25. The method of claim 18, further comprising the step of approximating the internal finite element geometry by adaptive curve fitting.

26. The method of claim 16, further comprising the step of transmitting the attribute data to a numerical control machining system.

27. A computer readable medium having a program for evaluating attribute data of a radial cooled bucket for a turbine engine, comprising the steps of:

a) providing a model the radial cooled bucket, the model having an external finite element geometry and an internal finite element geometry;

b) simulating, in a heat transfer analysis, a predicted response of the radial cooled bucket based on the model having a plurality of external boundary conditions and a plurality of internal boundary conditions;

c) optimizing the internal finite element geometry by comparing the predicted physical response to a predetermined baseline; and

d) modifying the internal finite element geometry of the model and the internal boundary conditions in response to step c);

e) repeating steps b) through d) until an optimum radial cooled bucket is determined; and

f) outputting the attribute data upon determining the optimum radial cooled bucket.

28. A method of optimizing a radial cooled bucket of a turbine engine implemented on the computer processing system comprising the steps of:

a) receiving a solid model geometry of a bucket to the finite element analysis module, the solid model geometry having an external geometry;

b) storing the boundary conditions of the external geometry;

c) creating an internal cooling geometry of the solid model geometry and a finite element mesh of the internal cooling geometry, and generating boundary conditions of the internal cooling geometry, and creating a finite element mesh of the external geometry;

d) mapping the boundary conditions to the finite element mesh of the internal cooling geometry and the external geometry to create a bounded finite element mesh;

e) executing a finite element heat transfer analysis on the bounded finite element mesh to produce a plurality of performance parameters;

f) comparing the plurality of performance parameters to a baseline criteria to optimize the internal cooling geometry of the solid model;

g) responsive to step f), if the plurality of performance parameters and the baseline criteria does not match, updating the internal cooling geometry of the solid model; and

h) repeating steps c) through g) until the plurality of the performance parameters and the baseline criteria match.

29. A bucket of a turbine engine designed in accordance with a method of optimizing a radial cooled bucket of a turbine engine implemented on the computer processing system comprising the steps of:

a) providing a solid model geometry of a bucket to the finite element analysis module, the solid model geometry having external geometry;

b) storing the boundary conditions of the external geometry;

c) creating an internal cooling geometry of the solid model geometry and a finite element mesh of the internal cooling geometry, and generating boundary conditions of the internal cooling geometry, and creating a finite element mesh of the external geometry of the solid model;

d) mapping the boundary conditions to the finite element mesh of the internal cooling geometry and external geometry;

e) executing a finite element heat transfer analysis on the bounded finite element mesh to produce a plurality of performance parameters;

f) comparing the plurality of performance parameters to a baseline criteria to optimize the internal cooling geometry of the solid model;

g) responsive to step f), if the plurality of performance parameters and the baseline criteria does not match, updating the internal cooling geometry of the solid model; and

repeating steps c) through g) until the plurality of the performance parameters and the baseline criteria match.